15 National Park Service. "Micronesian Resources Study: Protecting Historic Properties and Cultural Traditions in the Freely Associated States of Micronesia." A report on cultural resource management needs in the Republic of Marshall Islands, the Federated States of Micronesia, and the Republic of Palau. (March 1994.): 4.

16 As spoken by Jose Rivera Flores preserved in vernacular colloquialism. English translation: Baby. When did these things become artifacts? These things should be treated like turtles and fanihi (fruit bats) [endangered species]. No body can own any of it. There should also be stiff penalties for those accepting any kind of artifact. Just call it accepting stolen property. Your office needs to come down hard! I'm telling you right now. It's just like poaching deer. If caught, you confiscate the truck, the guns and the carcass. You better check into that low radio active paint to start marking all the things [artifacts] and buy a Geiger counter. They use that in the military [to mark government property.] It's safe.

17 Haunani-Kay Trask. *From a Native Daughter: Colonialism and Sovereignty in Hawaii.* (Monroe, Maine: Common Courage Press, 1993): 154. For another perspective, see Lin Poyer. "Defining History Across Cultures: Islander and Outside Contrasts." *ISLA: Journal of Micronesian Studies* 1 no. 1 (Rainy Season 1992): 73-98.

18 William Chapman and Delta Lightner. "Historic Preservation Training in Micronesia, An Assessment of Needs." *CRM* 19:3 (1996): 13-14.

Maria Annie Flores is a historic preservation specialist for the Historic Resources Division, Department of Parks and Recreation, Guam. She is a graduate student of Micronesian Studies, University of Guam. She has been awarded a grant from the Guam Humanities Council and the National Endowment for the Humanities for oral history research of Francisco Quinata Sanchez.

Victor Hara Torres

Guam's GIS Program

The Guam Historic Preservation Office (GHPO) is now utilizing Geographic Information Systems (GIS) technology. In fiscal year 1998-1999 the GHPO applied for additional historic preservation funds from the National Park Service to develop a GIS program. The project involved the purchase of computer hardware, a plotter, GIS software, training, and the completion of specific tasks.

A primary reason for developing the GHPO's GIS capability was to update Guam's Historic Sites Inventory (GHSI) maps. The addition of hundreds of sites to the site inventory by an early 1990s building boom necessitated such action. The existing 1:4800 Orthophoto maps, which were over 20 years old, were also cumbersome for fieldwork. Newer site locations were hand drawn onto paper United States Geological Survey (USGS) maps and not the old Orthophotos. The USGS paper maps began fraying at the edges from use. There had to be a better way to preserve and graphically display site information. That way was through the use of GIS technology.

ArcView GIS products from Environmental Science and Research Institute (ESRI) based in Redlands, California were chosen. The University of Guam's Water and Environmental Research Institute (WERI) was selected as the contractor to conduct the GIS training and development of the GIS historic sites coverage and application.

The development of the historic sites coverage was actually quite simple because the GHPO already had in place a Historic Sites Inventory database. This database with selected site information had either single point or boundary coordinate data for each site. The GHPO GIS uses the site single point coordinate data in the database to create the historic sites map coverage as points or selected symbols on digital maps.

It was in solving problems associated with using the base maps and the cadastral map data that WERI's expertise became invaluable. The GHPO decided to utilize both the USGS topographic maps and Government of Guam's 1992-94 Digital Orthophotos as base maps. Though useful, the USGS topographic maps were last revised in 1975. Therefore, the government of Guam's Digital Orthophotos, photographed from 1992-1994 were also used for their more current ground data. Due to the different base map coordinate systems, Universal Transverse Mercator Grid (UTM) and Government of Guam Grid (GG) respectively, software was purchased that would calculate existing UTM coordinate values into GG coordinate values. The GG coordinate values derived from the UTM data were then placed in separate fields in the GHSI database. The user's choice of which base map format to use determines which site coordinate data fields are chosen to create the coverage.

The GIS has proven to be valuable in the following ways:

Map Making. GIS gives us the capability to produce maps with flexibility that we never had before. It allows us to portray historic sites on maps of different scales and formats. We print large format paper maps for presentations, smaller ones for the field, and even smaller ones to update or enhance maps in site inventory files. We can do this for all or only particular types of sites, for either the whole island or within a specified area. They can be reprinted as necessary. As another author noted, "This represents a considerable advantage over paper-based systems which are exceptionally difficult to modify or to expand upon in the face of new demands."[1]

Performing Geographic Queries and Analyses. Another great feature of GIS is that from your computer desktop you can quickly access various maps and selected site information from a database at your fingertips.

> The power of GIS centers on the relationships between map themes and attributes. This integration allows users to manipulate maps, run queries, or model future events. Users can quickly locate resources on a map based on a database query, or conversely, locate database information via a spatial query of map themes.[2]

This is quite an advancement from searching paper maps, hard copy lists, and filing cabinets. GIS has become a valuable tool in project reviews, management of Historic Site Inventory information, and historic site analysis with regard to many factors.

Checking the Accuracy of Site Coordinate Information. In our use of GIS to update our site maps, we found a number of errors in the site coordinate data submitted to the GHPO. This fact became readily apparent in GIS. There were even a number of terrestrial sites that were shown as being offshore from Guam. Fortunately, GIS made it easier to correct the errors.

Once a site was determined to be in the wrong place we referred to the site inventory files and maps to find and digitize the proper location. Many of the early surveys used USGS topographic maps. In these cases, we used the GIS to give us the correct site coordinates after the site was properly located on the digital USGS base map. The process was easier if the historic property was a building or a structure shown on the base maps.

Many prehistoric sites do not show up as features on base maps. They can be difficult to map accurately. The detailed drawings and descriptions on the site inventory forms then become very important in determining where to place the site on the digital map. One time a call to the archeologist who surveyed the site helped in accurately locating the site on a map. In some cases additional fieldwork will be necessary to relocate sites.

Improved Data Capture and Sharing. GIS allows the GHPO to accept new historic sites coordinate data from inventory surveys in a digital format, which can be downloaded and used to create coverage quite quickly. Data received in this manner allows for reduced data capture needs, immediate mapping, and reduced data entry error.

We have also obtained other map coverages for coastlines, rivers, wetlands, parks, roads, etc., from the Government of Guam as well as federal agencies. More coverages are being developed for other resources. An updated USGS map is also expected to be available soon.

Much effort was necessary to develop the GIS program, but a good database is of critical importance. Having the support of management, staff, and other government agencies developing GIS products is also important. However, having the increased flexibility and power to graphically portray, manage, and analyze historic site data within the context of their geographic environment makes the effort worth it for the GHPO. In fact, we have only started to utilize Geographic Information Systems as a tool for the 21st century.

Notes

1 William Moss, Daniel Simoneau, and Benoît Fiset, "Archeology, GIS and Urban Planning in Quebec City," *CRM* Vol.21, No.5 (National Park Service, 1998): 20.

2 Diedre McCarthy, "Applying GIS Technologies to CRM," *CRM* 21:5 (National Park Service, 1998): 34.

Victor Hara Torres, born and raised in Guam, received a BA in anthropology and MPA from the University of Guam. With the Guam Historic Preservation Office since 1988, he is currently a Historic Preservation Specialist II.